

What is claimed is:

1. A vacuum arc vapor deposition apparatus comprising:

a film forming chamber containing a substrate and being vacuum discharged;

5 a vacuum arc evaporating source for producing a plasma containing a cathode material by vaporizing a cathode by vacuum arc discharge;

a magnetic coil for generating a magnetic field for deflecting or converging said plasma produced by said vacuum arc evaporating source, and guiding said plasma to the vicinity of said substrate within said film forming chamber;

10 a coil power source for feeding a coil current for generating said magnetic field to said magnetic coil, said coil power source reversing a flowing direction of the coil current fed to said magnetic coil; and

a control unit for controlling said coil power source to reverse the flowing direction of the coil current fed to said magnetic coil.

20 2. The vacuum arc vapor deposition apparatus according to claim 1, wherein a plurality of vacuum arc evaporating sources are provided, and said magnetic coil generates a deflection magnetic field for deflecting said plasma.

25 3. The vacuum arc vapor deposition apparatus according

to claim 1, wherein said control unit performs a control for repeatedly reversing the flowing direction of said coil current every predetermined time.

5        4.        The vacuum arc vapor deposition apparatus according to claim 1, further comprising:

         a plurality of thickness detecting units, disposed in the vicinity of said substrate, each for measuring a thickness of a film formed by said plasma,

10        wherein said control unit performs the control for reversing the flowing direction of the coil current when a difference between film thickness values as measured by said plurality of thickness detecting units exceeds a predetermined value.

15

         5.        The vacuum arc vapor deposition apparatus according to claim 1, further comprising:

         a plurality of ion current detecting units, disposed in the vicinity of said substrate, for measuring ion currents which  
20        flows when ions in said plasma are incident thereon; and

         a plurality of current integrators for integrating ion currents flowing through said ion current detecting units,

         wherein said control unit performs the control for reversing the flowing direction of the coil current when a  
25        difference between current values integrated by said plurality

of said current integrators exceeds a predetermined value.

6. The vacuum arc vapor deposition apparatus according  
to claim 1, wherein the substrate rotates about its center.

5

7. The vacuum arc vapor deposition apparatus according  
to claim 6, wherein the flowing direction of the coil current  
is reversed at a time interval which is integer times as long  
as a time taken for one rotation of the substrate.

10

8. The vacuum arc vapor deposition apparatus according  
to claim 1, wherein said control unit controls a time of flowing  
the coil current in a predetermined direction and a time of  
flowing the coil current in a reverse direction to be equal  
15 with each other.

9. A vacuum arc vapor deposition method comprising;  
producing a plasma containing a cathode material by  
vaporizing a cathode by vacuum arc discharge;

20

feeding a coil current for generating a magnetic field  
to a magnetic coil to deflect or converge said plasma thus  
produced and guide said plasma to the vicinity of a substrate;  
and

reversing a flowing direction of the coil current fed  
25 to the magnetic coil.

10. The vacuum arc vapor deposition method according to claim 9, wherein the flowing direction of said coil current is repeatedly reversed every predetermined time.

5

11. The vacuum arc vapor deposition method according to claim 9, further comprising:

measuring a thickness of a film formed by said plasma at a plurality of points in the vicinity of the substrate,

10 wherein the flowing direction of the coil current is reversed when a difference between film thickness values thus measured exceeds a predetermined value.

12. The vacuum arc vapor deposition method according to claim 9, further comprising:

measuring ion currents at a plurality of points in the vicinity of the substrate,

20 wherein the flowing direction of the coil current is reversed when a difference between current values thus measured exceeds a predetermined value.